UTILITY OF MULTIPLE MEASUREMENTS OF CONTROL LIMB VOLUME TO ASSESS THERAPY OUTCOMES FOR UNILATERAL ARM AND LEG LYMPEDEMA

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**Purpose:** Outcomes of therapy for unilateral limb lymphedema are often determined using limb-volumes of affected ($V_A$) and control limbs ($V_C$) to calculate changes in edema-volume ($E_V$) from pre-treatment values ($E_{V1}$) through end-treatment ($E_{V2}$). Some clinics measure $V_C$ at all visits but others only measure $V_C$ at initial visits and use these single values to determine final edema volumes ($E'_{V2}$). Not measuring $V_C$ at each visit is time saving, but the effect of using a single pre-treatment $V_C$ value to determine $E_{V2}$ is unclear. Our goal was to compare $E_{V2}$ and $E'_{V2}$ as outcome measures.

**Methods:** Patients with unilateral arm lymphedema secondary to treatment for breast cancer (N=75) and patients with unilateral leg lymphedema (N=45) were evaluated. All had at least 10% pre-treatment edema volumes and had received 10 complete decongestive physiotherapy treatments. Limb volumes were determined before and after therapy using a truncated-cone model and validated automated software†.

**Results:** Pre-treatment edema volumes (mean±sd) were 939±567 ml for arms and 2272±2302 ml for legs. Analysis showed that $E_{V2}$ was significantly greater than $E'_{V2}$ and yielded a smaller therapy-related reduction in percentage edema. Thus, $E_{V2}$ exceeded $E'_{V2}$ for arms (571±381 vs. 502±414 ml, p=0.002) and for legs (1388±1814 vs.1206±1778 ml, p=0.002) with corresponding percentage reductions in edema volume being less for arms (39.2±26.4 vs. 49.5±30.7%, p=0.003) and for legs (47.0±35.6 vs. 60.0±37.3%, p=0.002).

**Conclusions:** Non-use of end-therapy control limb volumes led to overestimation of therapy effectiveness. The practice of using only pre-treatment control limb volumes as reference is best avoided.

†Limb Volumes Professional 4.0, www.limbvolumes.org